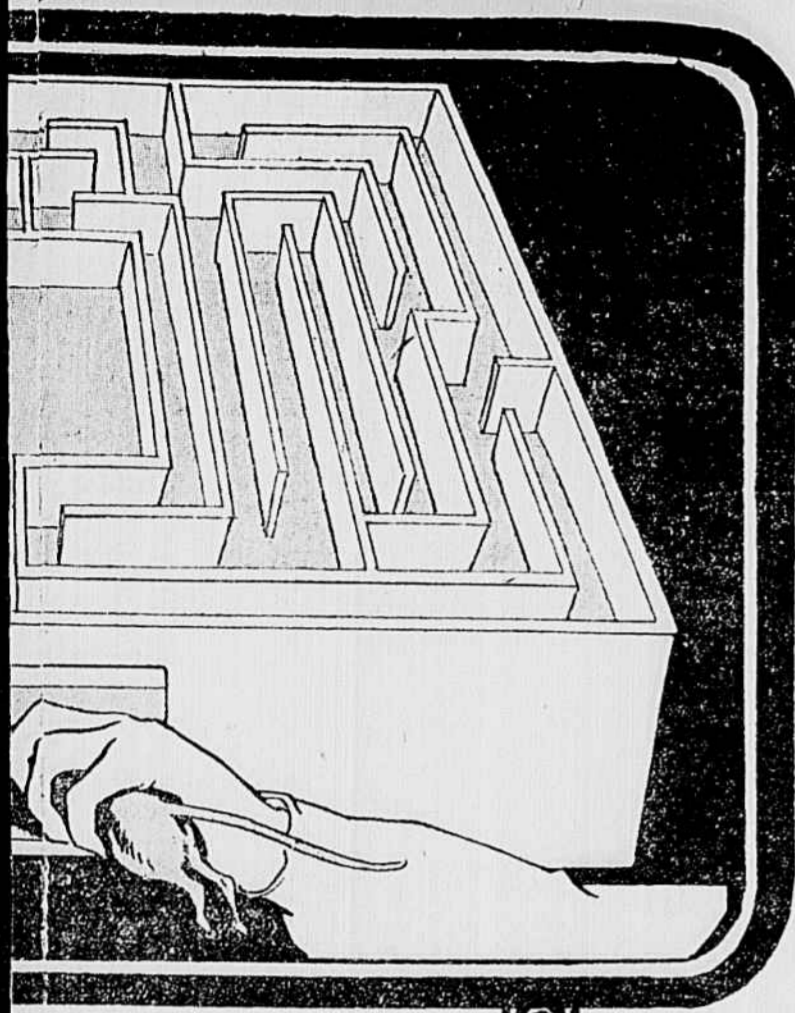
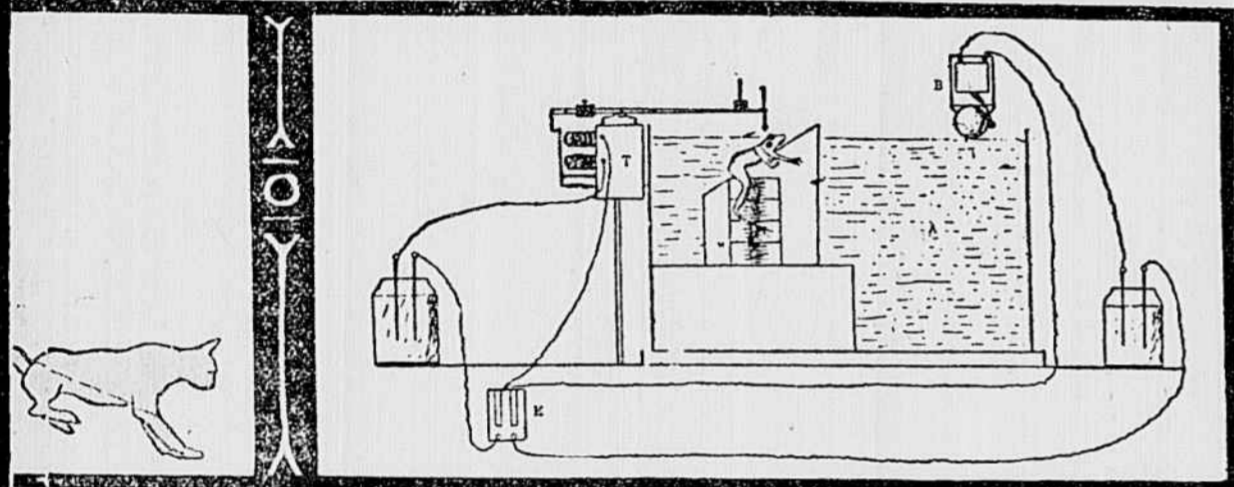


With Animals and Insects



This shows a maze which may be used in various ways to test the intelligence of different animals. The animal is put in at O (letters shown in the small diagram), and he is encouraged to find his way to the centre of the maze at H by food placed there. The experimenter watches how quickly the animal improves in learning the correct path. One of Prof. Watson's rats required 39 minutes for the first successful trip and reduced the time to 30 seconds on the thirtieth trial.

At A, B, D, E, F are blind alleys, and after running up these a few times the rat finds that he has wasted his time. The turning at C is not a blind alley, but a longer way of reaching the food. If the rat is a bright pupil he learns in time to avoid this turning.



Apparatus Used in Proving that a Frog Could Hear Under Water. A, Aquarium; B, Electric Bell; T, Tactile Stimulus Apparatus; K, Hand Key for Giving Stimuli; W, Weight to Hold Leg.

From "Behavior," By Professor John B. Watson. Published by Henry Holt & Co.

food which they could not see and neglected the objects they could see. When the nerve of smell was removed from the fish they lost the power to find the food.

How animals see what lies before their eyes is a difficult problem that has not been settled by the students of animal behavior. It is certain that they do not see in the same way as human beings. In many cases as the result of experiment it appears that they see a kind of flat pattern before them in which the objects have no depth or body. This is known to scientists as "pattern discrimination." Evidently, however, there is an enormous difference between the vision of different kinds of animals, and many persons will still insist that an intelligent dog sees things very much as a human being does. Some animals distinguish no colors, others a very few, and others a considerable number.

Dr. Karl von Frisch has made extensive studies on the color vision of bees. He arranged thirty graded discs of cardboard extending from white to black upon a rectangular piece of cardboard in such a manner that it was possible to insert other discs of the same size among them. Two yellow discs, each supporting a watch glass of honey were placed among the gray discs.

After the bees had been collecting food from these yellow discs for two days they were removed and new yellow discs each supporting an empty watch glass were placed on a different part of the rectangle. Immediately these were visited by the bees; but no attention was paid to the gray discs. Bees that had been trained to forage from yellow discs alighted on the yellow pencil with which Frisch was taking notes.

In a similar manner the bees were trained to forage from blue discs. Such bees in four minutes made 282 visits to the blue discs and only three to the gray. Empty watch glasses were now placed on the blue discs and similar glasses containing sweetened water on the gray. The bees attempted to feed from the empty dishes on the blue discs but paid no attention to the full ones on the gray. In like manner an attempt was made to train the bees to feed from red discs. Such bees visited equally the red, dark gray and black papers. These experiments show that bees have color vision, for they can distinguish yellow and blue from gray, but they are color blind to red.

A large number of experiments by M. & I. Watson led to the curious conclusion that rodents recognized only, or "reacted" to, as the scientists say, green. Two rats were trained to familiarity with green and red objects. When objects of the two colors were presented they recognized green alone and neglected red.

A gray Belgian hare, familiarized with blue objects, failed to distinguish the color in over 500 trials. Two white hares, familiarized with yellow and blue, failed to show any discrimination.

Chickens Can Tell Differences of Size

Some experiments on birds throw interesting light on the nature of animal sight. Chickens learned to discriminate between circles whose diameter differed by one-fourth to one-sixth. The experimenter concludes that this discrimination was made entirely on the basis of size. He also succeeded in teaching one bird to distinguish between a circle and a triangle of equal area. The bird was unable, however, to make this discrimination when the position of the forms was changed, and he thinks the power depended

Cold Makes Animals Uncomfortable More Quickly Than Heat.
Male Crows Are Much More Intelligent Than Females.
Cockroaches Can Remember and Have Emotions.
The Stomach and Intestines Have No Feeling.
Porcupines Can Distinguish Ten Shades of Gray.
Monkeys Like to Drum as Babies Do.
Cats Are Color-Blind in the Daytime.
Fish Can Smell Their Food.

The Eyes of the Snail Are Blind.
Hens Can't Count.

on the unequal stimulation of different parts of the retina.

An octopus which had been blinded for more than a month was placed in a tank, the water of which was constantly being renewed from a faucet placed near the middle of the aquarium. When the octopus was quietly resting at one end a small dead fish was thrown into the opposite end, which came to rest on the bottom. In 1.25 minutes the octopus became agitated. Movements of the arm began and then of the whole body. In 3.5 minutes the animal had reached the middle of the basin. At the end of 5 more seconds one arm touched the fish. The fish was seized and carried to the mouth.

J. P. Porter found that hens would imitate an easier method of opening a door from a trained hen. In another experiment a hen accustomed to receiving four grains of corn for opening a door, accepted three when placed at the usual spot, although there were four grains but an inch away, suggesting that she could not count.

Odd Discoveries About Animals' Eyes

Professor Hess experimented on various fishes and the larvae of mosquitoes. He found that they were affected only by the intensity and direction of the light rays and did not recognize colors.

Professor Plesner found that the "ocelli" or "eyes" of the star fish serve only to distinguish variations in the intensity of light. They do not enable the starfish to see images nor to detect movement, but by their means the fish is able to direct its movements toward a streak of light or toward dark objects. When the ocelli were removed the starfish was unable to find its way to light and dark regions.

Some spider crabs have the curious habit of decking themselves with various foreign growths. Contrary to general belief, it has been found that there is no tendency on the part of the crabs to select materials that correspond to the prevailing color of their surroundings. This would indicate that they decorate themselves for the pleasure it gives them, just as a woman might wear a wreath of roses round her neck.

These crabs, when blinded, decorate themselves, but they display no sensitiveness to light. Crabs which had previously been exposed to white, yellow, blue, green or red light, showed a manifest tendency to go toward the same kind of light when they were free to move toward any one of these colors. This suggests that they have a kind of ability to distinguish colors and is opposed to the conclusion of another scientist referred to that the lower animals do not distinguish colors.

There is much of interest to be learned about snails, but it is slow work watching them. During the period of mating activity, snails showed much nerve sensitiveness to light, more intelligence, if the term can be used of such a creature. They progressed with greater rapidity and in a straighter path toward their food. This curious observation was made by Professor J. S. Szymanski, of Germany.

Another investigator, Professor E. Yung, has found that the so-called eyes of snails have no power of perceiving light. Other parts of the body, however, possess this power. Of what use then, are the eyes? They may, perhaps, be useful in some way to perceive temperature or food.

Certain species of mosquitoes turn toward the light and others away from it. Fortunately among those that turn away from it is anopheles maculipennis, the kind that carries malaria, which, therefore, flies only at night. This mosquito, however, turns toward a certain low intensity of light, while flying from strong light. Hence a light in a window at night will usually attract it.

New observations of intelligence or at least remarkably useful habits have been found in many families of insects. The potter bee moistens a clod of earth with fluid from her mouth and then cuts out a piece with which to construct her water bottle shaped nest on a sphere of Bermuda grass. All of the work of plastering, modeling and smoothing is performed by the mandibles and the first pair of legs.

An observer describes the interesting mining bee building a nest. The soil is moistened with water brought in the bee's mouth from a pond seventy-five yards away, is loosened by the mandibles and is cast aside by the second and third pair of legs. As the soil is used to form a rim of moistened earth around its mouth. When the nest has been stored with pollen and the eggs laid, this rim is removed and used to fill partly the burrow. Less than twenty-four hours is required to complete the nest.

Very Thrifty Habits of Boston Wasps

Thrifty is shown in a high degree by some of the wasps. The potter wasp stocks its burrows with enough caterpillars to last its larvae until they are ready to turn into pupae and crawl around and feed themselves. There is a mining wasp which captures enough food to raise the young, lays its eggs and then pays no further attention to them.

Wasps of a species observed near Blue Hills, Boston, capture large numbers of the winged females of the ants during the nuptial flight of the latter. After paralyzing the ants and removing the wings the wasp stores them in one of the pockets of her burrow. Later she lays an egg in one of the empty compartments. When her child is hatched the mother brings ants from the storeroom, cuts them in two and feeds them to her greedy larvae. When this young creature has changed into a pupa the wasp lays another egg and raises another larva in the same manner.

One of the oddest things observed was a fly robbing a spider. C. A. Frost noticed three flies dart under the legs of a spider and suck the juices of a bug upon which the spider was feeding.

Certain tropical spiders prey upon small birds. Mr. E. C. Chubb, of British Guiana, describes a large spider which catches small fish and tadpoles. When this spider goes fishing it rests its hind pair of legs upon a stone and the tips of the six outstretched legs upon the water, with its head at about the centre of the bunch of legs, the spider awaits developments. The moment a small fish or tadpole appears within range the legs close about it like the claws of

a trap and the mandibles deliver a deadly blow. The captive is then dragged to the top of the rock and eaten.

Experiments on the strength of animals have given surprising results and show how superior they are to man in this respect. Professor Felix Plateau, the Belgian naturalist, found that an oyster could hold a 40-pound weight between the edges of its half-opened shell. This was equivalent to a 100-pound man holding up 40 tons.

The same scientist found that a small lobster's claw could compress a dynamometer until it registered twenty pounds. This was twenty times its own weight. A 100-pound man, as a rule, records about 100 pounds. If his hand was as powerful as the lobster's claw he would be able to record 3,000 pounds.

Even plants have feelings and emotions. Experiments by Professor J. C. Base, of the University of Calcutta, show surprisingly close similarity between the reaction of plants and animals to stimuli of many kinds. His experiments, skillfully conducted with ingenious instruments of precision, show that plants not only have "sensibility," some of them to an extent that approaches that of the lower forms of animal life, but that it is much the same sort of sensibility.

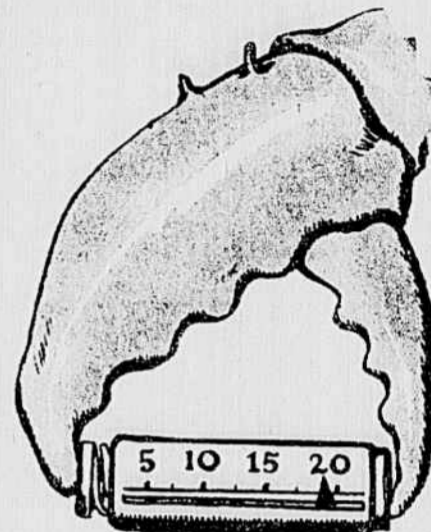
In other words, plants are affected in the same way, though, of course, in much less degree, by fatigue, electricity, and injuries; they are excited and depressed by the same drugs; they suffer and die from the same poisons, and they give many indications that between themselves and animals, even of the higher sort, there is not that qualitative difference the existence of which has been commonly assumed.

The secret of how the chameleon may change its color and shift its shades through wide varieties of yellow, blue and black, has been solved by S. J. Holmes, associate professor of zoology at the University of California, according to an announcement from that institution.

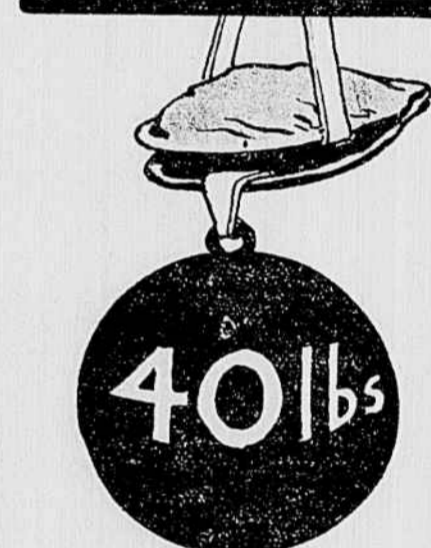
There has been a scientific dispute as to whether the chameleon propensities were accounted for by a change of position of the pigment, or color, within its cell, or by the actual movement of the cell itself. Holmes removed pigment cells from a frog, and, under a microscope, proved that the cells wander and creep about to a considerable distance.

In a series of experiments on the taste and smell of the little crustacean called "Palaemon," Professor H. Balss, of Berlin, found that the sense of smell is located partly in the antennae and partly in other parts of the body. Taste is located in the mouth parts and tips of the legs.

Professor R. P. Cowles, who has been in the Philippines, describes the method by which a sponge-carrying crab snips loose a piece of sponge, pushes its body under it and carries it off while holding it with the posterior pair of legs.

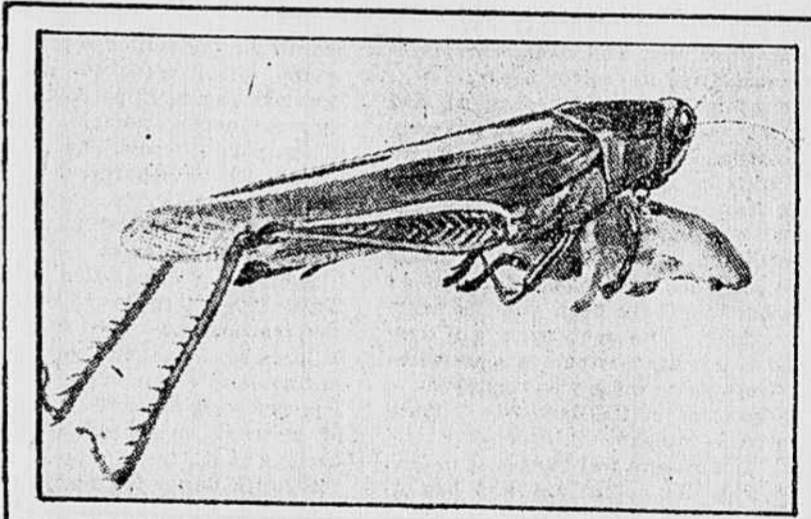


The Lobster's Claws Have a Nipping Force of 20 Pounds, Fifty Times a Man's Strength.



The Oyster Can Hold Up a Weight of 40 Pounds Before Its Shell Will Open.

Gigantic African Locust Photographed in the Act of Catching a Mouse, Which It Will Devour.



maker of South America, Who Enjoys Spon Like a Baby.

The ingenious apparatus shown on this page was constructed in order to observe the effect of sounds upon the frog. The animal is mounted in a saddle so that its legs hang free. When the frog has ceased to struggle it is stimulated by touch and the distance to which the leg is jerked up is measured. It was found that a loud sound by an electric bell had no effect on the kick, a moderate sound reduced the kick, while a slight noise increased it. The frog could hear under water as well as in the air.

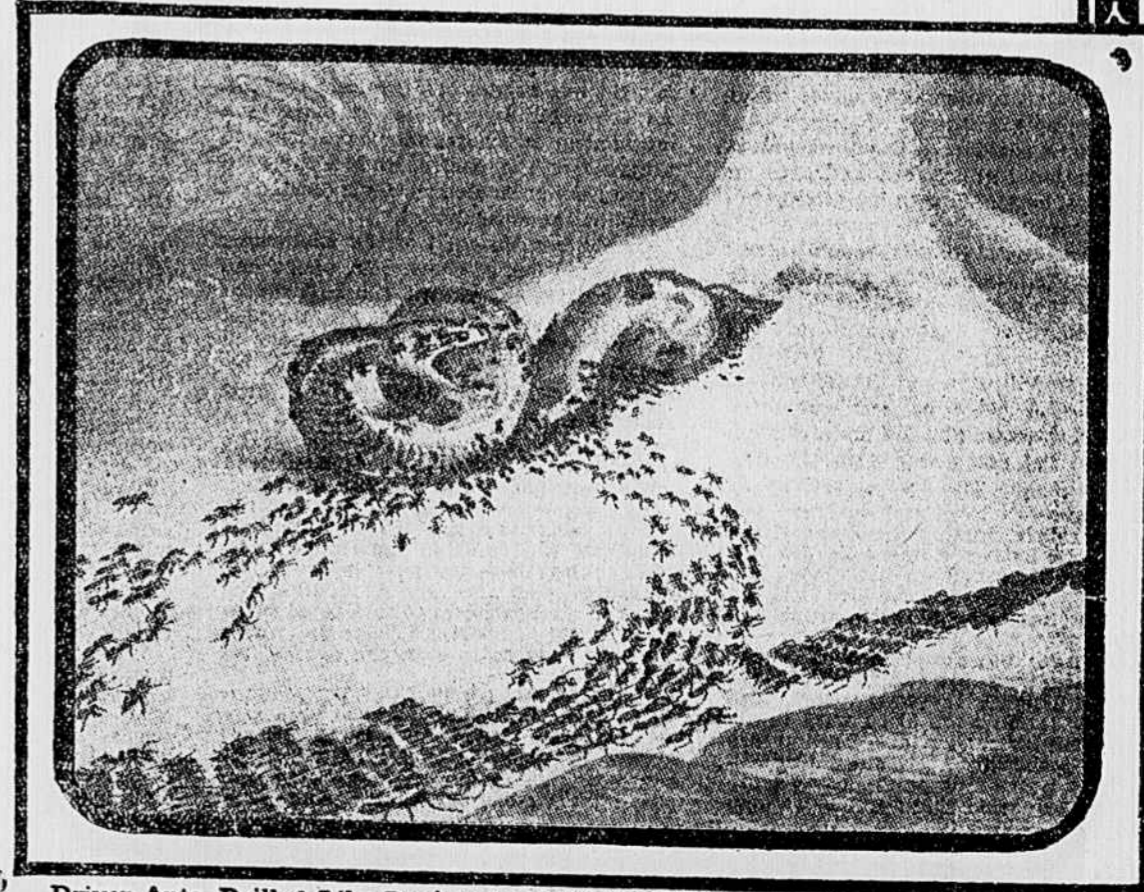
Professor Parker has made some curious experiments on the hearing of fish.

In the more highly developed fish there is a well marked internal ear, although there is no external ear. In response to the vibrations made by the string he noted in normal fish four kinds of movement: (1) Vibratory movements of the pectoral fins; (2) Change in the rate of respiratory movement, usually increased; (3) If the sound was at all intense there was a slight movement of the caudal fin; (4) Finally, the fish under strong stimulation would make a quick spurt or spring forward.

In fish whose auditory nerves had been cut, he failed to obtain the movements of the pectoral fins, which was the most characteristic response and the one easiest to observe. Ten fish were observed and 11 observations were made upon each animal. In 82 observations he obtained no response from the pectoral fin. In 18 there was a slight movement. He next made the skin insensitive by cutting the sensory nerve supply of the skin area—viz., the fifth, seventh and part of the tenth cranial nerves and transecting the cord between the fourth and fifth vertebrae.

The auditory organs, after such an operation, were presumably still completely functional. Parker states that the auditory responses in such animals were normal. In other words, the fish heard with their ears and did not.

Fish depend more upon smell than sight in finding food. When concealed packages of food and receptacles that had formerly been used for food were placed in the water, the fish found their way to the



Driver Ants, Drilled Like Regiments of Soldiers, Attack a Big Snake and Eat It Up.